



# HARTCROWSER

Earth and Environmental Technologies

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J-2296-07

November 25, 1998

Mr. Gregory A. Rapp  
Construction Services Manager  
Potlatch Corporation  
1100 Railroad Avenue  
P.O. Box 386  
St. Maries, Idaho 83861

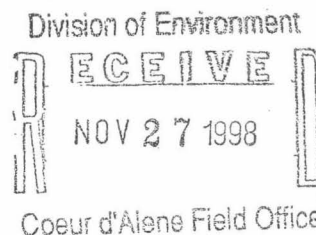
Re: Third Quarter 1998 Performance Report  
Avery Landing Recovery System

Dear Mr. Rapp:

Hart Crowser is pleased to present the Third Quarter 1998 Performance Report for the free product recovery system at the Avery Landing site. This letter report presents the third quarter groundwater elevation and product thickness measurements.

## GROUNDWATER AND PRODUCT QUARTERLY MONITORING

Four extraction wells (EW-1 through EW-4), four monitoring wells (HC-1, HC-4, MW-5, and MW-11), and two piezometers (P-1, and P-2) were monitored on October 22, 1998. At each monitoring location, depth-to-product and depth-to-groundwater measurements were recorded. The river elevation adjacent to each extraction well vault was also monitored by measuring the elevation difference between the top of the vault and the river. These measurements are presented with those of previous monitoring rounds in Table 1. Well locations and current groundwater contours are shown on Figure 1.





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Extraction wells EW-3 and EW-4 are maintaining groundwater capture. Extraction well EW-2 was started at 11:00 a.m. October 22, and was maintaining groundwater capture by 1:00 p.m. Extraction wells EW-1 and EW-2 have been shut down since August of this year, as requested by the Idaho Department of Environmental Quality. Extraction wells EW-2 and EW-4 are maintaining the maximum drawdown based on the observation that the well pumps are shutting off intermittently, which they would do only under maximum drawdown. Extraction well EW-3 is the only extraction well that appears to be operating continuously, as we did not observe the pump cycle during our site visit. The elevation difference between the groundwater and the St. Joe River, as shown on Figure 1, has increased significantly for this year.

*Not seeing this*

## PROJECT SCHEDULE

We will submit an Annual Report for 1998 by February 5, 1999. If you should decide that this date needs to be altered, please let us know as soon as possible.

## LIMITATIONS

Work for this project was performed, and this letter prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar location, at the time the work was performed. It is intended for the exclusive use of the Potlatch Corporation for specific application to the referenced property.





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If additional information or clarification is required, please call Terry Montoya at (206) 324-9530.

Sincerely,

**HART CROWSER, INC.**

*for* *Shuri Salvador*  
**TERRY MONTOYA**  
Project Engineer

*Matt Schultz*  
**MATT SCHULTZ, P.E.**  
Senior Associate Engineer

229607/Ptlc1098.doc

Attachments:

Table 1 - Avery Landing Groundwater and River Monitoring Data  
Figure 1 - Avery Landing Third Quarter  
Groundwater Flow Direction Map

cc: Kreg Beck, Idaho Department of Environmental Quality



Table 1 - Avery Landing Groundwater and River Monitoring Data

Monitoring Location	Date	Depth to Product	Depth to Water	Product Thickness	T.O.C. Elevation	Groundwater Elevation
EW-1	10/27/94	ND	11	0	95.34	84.34
	6/30/95	ND	10.9	0	95.34	84.44
	9/21/95	11.25	11.27	0.02	95.34	84.07
	7/11/96	ND	9.74	0	95.34	85.60
	9/11/96	ND	10.88	0	95.34	84.46
	11/5/96	ND	11.94	0	95.34	83.40
	7/17/97	ND	10.38	0	95.34	84.96
	10/9/97	ND	13.17	0	95.34	82.17
	6/25/98	ND	10.01	0	95.34	85.33
	8/12/98	NM	10.52	0	95.34	84.82
	10/22/98	Sheen	10.86	0	95.34	84.48
EW-2	10/27/94	ND	10.37	0	95.24	84.87
	6/30/95	10.57	10.89	0.32	95.24	84.35
	9/21/95	13.9	13.92	0.02	95.24	81.32
	7/11/96	11.03	11.66	0.63	95.24	83.58
	9/11/96	Sheen	14.00	0	95.24	81.24
	11/5/96	Sheen	12.27	0	95.24	82.97
	7/17/97	8.99	9.09	0.1	95.24	86.15
	10/9/97	Sheen	15.44	0	95.24	79.80
	6/25/98	9.19	9.64	0.45	95.24	85.60
	8/12/98	NM	9.99	0	95.24	85.25
	10/22/98	Sheen	10.94	0	95.24	84.30
EW-3	10/27/94	ND	10.05	0	95.78	85.73
	6/30/95	9.35	9.8	0.45	95.78	85.98
	9/21/95	10.92	11.08+	0.16	95.78	84.70
	7/11/96	8.53	8.64	0.11	95.78	87.14
	9/11/96	10.75	11.70	0.95	95.78	84.08
	11/5/96	Sheen	11.8	0	95.78	83.98
	7/17/97	9.13	9.33	0.2	95.78	86.45
	10/9/97	10.9	11.68	0.78	95.78	84.10
	6/25/98	8.78	9.43	0.65	95.78	86.35
	8/12/98	NM	11	0	95.78	84.78
	10/22/98	12.58	13.38	0.8	95.78	82.4
EW-4	10/27/94	ND	8.05	0	94.32	86.27
	6/30/95	7.84	7.85	0.01	94.32	86.47
	9/21/95	8.22	8.24	0.02	94.32	86.08
	7/11/96	Sheen	6.44	0	94.32	87.88
	11/5/96	Sheen	8.08	0	94.32	86.24
	7/17/97	Sheen	5.43	0	94.32	88.89
	10/9/97	Sheen	7.11	0	94.32	87.21
	6/25/98	5.28	5.3	0.02	94.32	89.02
	8/12/98	NM	8.98	0	94.32	85.34
	10/22/98	ND	8.98	0	94.32	85.34

Table 1 - Avery Landing Groundwater and River Monitoring Data

Monitoring Location	Date	Depth to Product	Depth to Water	Product Thickness	T.O.C. Elevation	Groundwater Elevation
HC-1	10/27/94	ND	13.25	0	97.50	84.25
	6/30/95	ND	12.00	0	97.50	85.50
	9/21/95	NM	13.42	0	97.50	84.08
	7/11/96	ND	11.92	0	97.50	85.58
	9/11/96	ND	12.90	0	97.50	84.60
	11/5/96	Could not locate due to snow				
	7/17/97	ND	11.27	0	97.50	86.23
	10/9/97	ND	12.87	0	97.50	84.63
	6/25/98	ND	11.85	0	97.50	85.65
	8/12/98	NM	12.97	0	97.50	84.53
	10/22/98	ND	13.1	0	97.50	84.40
HC-4	10/27/94	13.3	15.34	2.04	98.94	83.60
	6/30/95	11.89	15.49	3.6	98.94	83.45
	9/21/95	13.67	NM	NM	98.94	85.27
	7/11/96	11.58	12.93	1.35	98.94	86.01
	9/11/96	13.53	13.93	0.40	98.94	85.01
	11/5/96	11.82	13.62	1.80	98.94	85.32
	7/17/97	11.65	13.25	1.60	98.94	85.69
	10/9/97	12.67	14.92	2.25	98.94	84.02
	6/25/98	11.53	12.49	0.96	98.94	86.45
	8/12/98	NM	13.9	NM	98.94	85.04
	10/22/98	10.3	14.7	4.40	98.94	84.24
HC-5	11/5/96	ND	11.22	0	97.95	86.73
	7/17/97	Monument under standing water				
	10/9/97	Monument under standing water				
	6/25/98	Lost during road construction				
MW-4	9/14/94	ND	12.88	0	99.76	86.88
	6/30/95	ND	10.19	0	99.76	89.57
	9/21/95	ND	11.95	0	99.76	87.81
	7/11/96	Sheen	10.18	0	99.76	89.58
	9/11/96	Sheen	11.33	0	99.76	88.43
	11/5/96	Lost during road construction				

Table 1 - Avery Landing Groundwater and River Monitoring Data

Monitoring Location	Date	Depth to Product	Depth to Water	Product Thickness	T.O.C. Elevation	Groundwater Elevation
MW-5	10/27/94	ND	10.45	0	97.76	87.31
	6/30/95	ND	9.13	0	97.76	88.63
	9/21/95	ND	10.83	0	97.76	86.93
	7/11/96	ND	8.98	0	97.76	88.78
	9/11/96	ND	10.71	0	97.76	87.05
	11/5/96	ND	10.65	0	97.76	87.11
	7/17/97	ND	8.75	0	97.76	89.01
	10/9/97	ND	10.89	0	97.76	86.87
	6/25/98	ND	8.56	0	97.76	89.20
	8/12/98	NM	10.68	0	97.76	87.08
	10/22/98	ND	13.5	0	97.76	84.26
MW-11	9/14/94	12	NA	NA	98.16	NA
	6/30/95	5.54	7.25	1.71	98.16	90.41
	7/11/96	6.34	10.00	3.66	98.16	88.16
	9/11/96	3.25	7.20	3.95	98.16	90.96
	11/5/96	3.05	7.20	4.15	98.16	90.96
	7/17/97	6.33	9.99	3.66	98.16	88.17
	8/12/98	NM	3.90	NM	98.16	94.26
	10/22/98	6.96	8.00	1.04	98.16	90.16
P-1	10/27/94	ND	17.31	0	101.42	84.11
	6/30/95	ND	16.72	0	101.42	84.70
	9/21/95	ND	17.4	0	101.42	84.02
	7/11/96	ND	15.87	0	101.42	85.55
	9/11/96	ND	16.98	0	101.42	84.44
	11/5/96	ND	17.06	0	101.42	84.36
	7/17/97	ND	15.34	0	101.42	86.08
	10/9/97	ND	17.64	0	101.42	83.78
	6/25/98	ND	14.53	0	101.42	86.89
	8/12/98	NM	16.72	0	101.42	84.70
	10/22/98	ND	15.6	0	101.42	85.82
P-2	10/27/94	ND	15.87	0	100.06	84.19
	6/30/95	ND	15.26	0	100.06	84.80
	9/21/95	ND	16.04	0	100.06	84.02
	7/11/96	ND	14.52	0	100.06	85.54
	9/11/96	ND	15.62	0	100.06	84.44
	11/5/96	ND	15.08	0	100.06	84.98
	7/17/97	ND	13.92	0	100.06	86.14
	10/9/97	ND	16.09	0	100.06	83.97
	6/25/98	ND	15.95	0	100.06	84.11
	8/12/98	NM	15.3	0	100.06	84.76
	10/22/98	NM	16.95	0	100.06	83.11

Table 1 - Avery Landing Groundwater and River Monitoring Data

Monitoring Location	Date	Depth to Product	Depth to Water	Product Thickness	T.O.C. Elevation	Groundwater Elevation
River at EW-1	10/27/94					83.12 *
	6/30/95					84.03 **
	9/21/95					82.24
	7/11/96					83.74 ***
	9/11/96					82.56
	11/5/96					83.16
	7/17/97					82.39
	10/9/97					83.00
	6/25/98					85.22
	8/12/98					85.42
	10/22/98					85.00
River at EW-2	10/27/94					84.41
	6/30/95					85.32
	9/21/95					83.53
	7/11/96					85.03
	9/11/96					83.85
	11/5/96					83.59
	7/17/97					85.35
	10/9/97					84.20
	6/25/98					86.42
	8/12/98					86.62
	10/22/98					86.20
River at EW-3	10/27/94					85.16 *
	6/30/95					86.07
	9/21/95					84.28
	7/11/96					85.78 ***
	9/11/96					84.60
	11/5/96					84.10
	7/17/97					86.31
	10/9/97					85.16
	6/25/98					85.16
	8/12/98					85.65
	10/22/98					85.23

Table 1 - Avery Landing Groundwater and River Monitoring Data

Monitoring Location	Date	Depth to Product	Depth to Water	Product Thickness	T.O.C. Elevation	Groundwater Elevation
River at EW-4	10/27/94					86.49 *
	6/30/95					87.40
	9/21/95					85.61
	7/11/96					87.11 ***
	9/11/96					85.93
	11/5/96					86.44
	7/17/97					87.27
	10/9/97					86.12
	6/25/98					88.34
	8/12/98					88.54
	10/22/98					88.12

Notes:

All measurements in feet.

\* River elevation was extrapolated from the river surface slope measured in 1995 and the river elevation measured south of EW-2 in 1994.

\*\* River elevation was extrapolated from river surface slope, based on river elevations measured south of EW-2, EW-3, and EW-4 in 1995.

\*\*\* River elevation was extrapolated from river surface slope, and the wood dock benchmark.

T.O.C. - Top of Casing

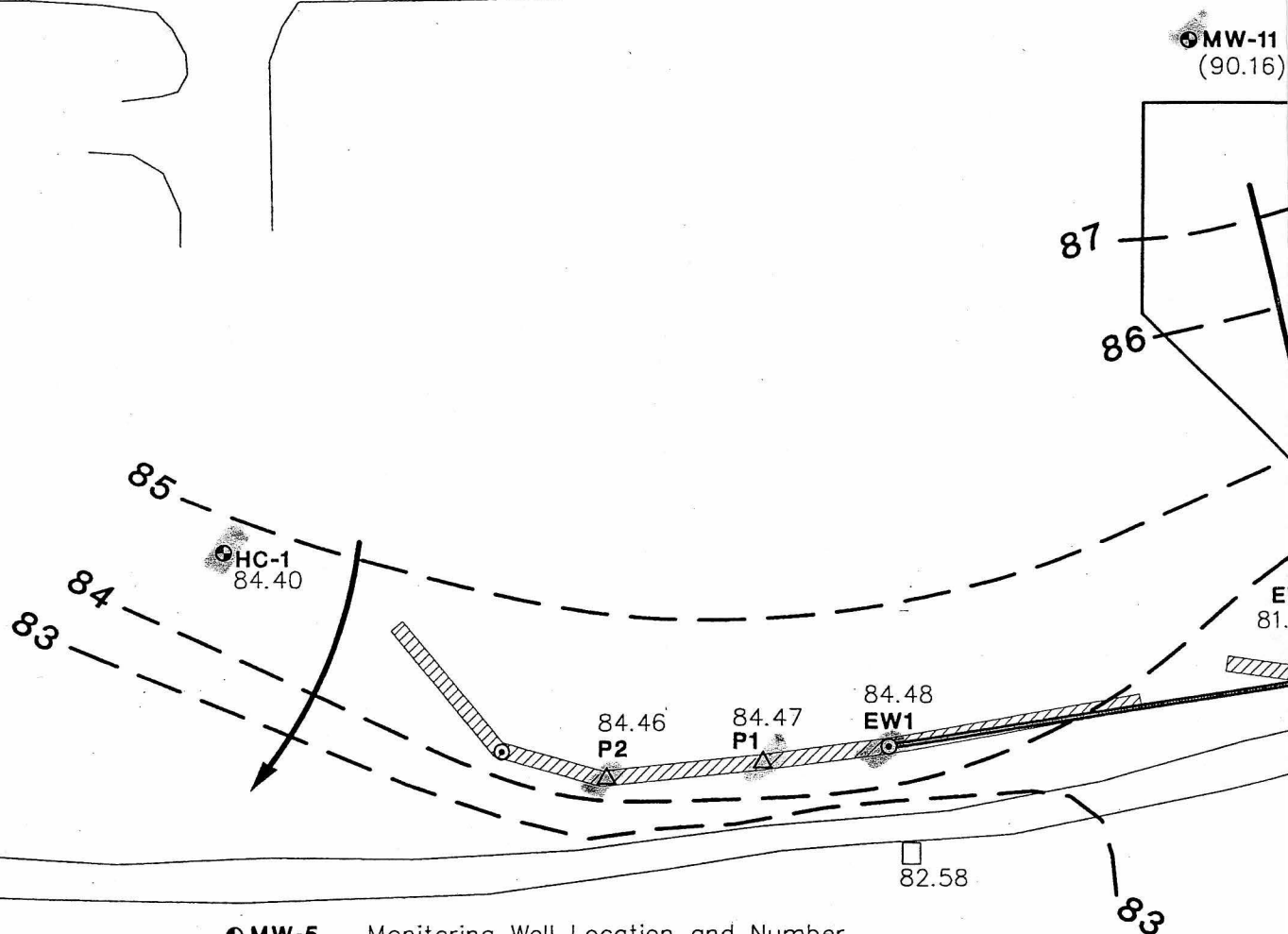
ND - Not Detected

NA - Not Available

NM - Not Measured

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# Avery Landing Third Quarter Groundwater Flow Direc



● MW-5 Monitoring Well Location and Number

87.26 Groundwater Elevation in Feet (10/22/98)

(84.24) Corrected Groundwater Elevation due to Free Product in Feet (10/22/98)

⊙ EW1 Extraction Well Location and Number

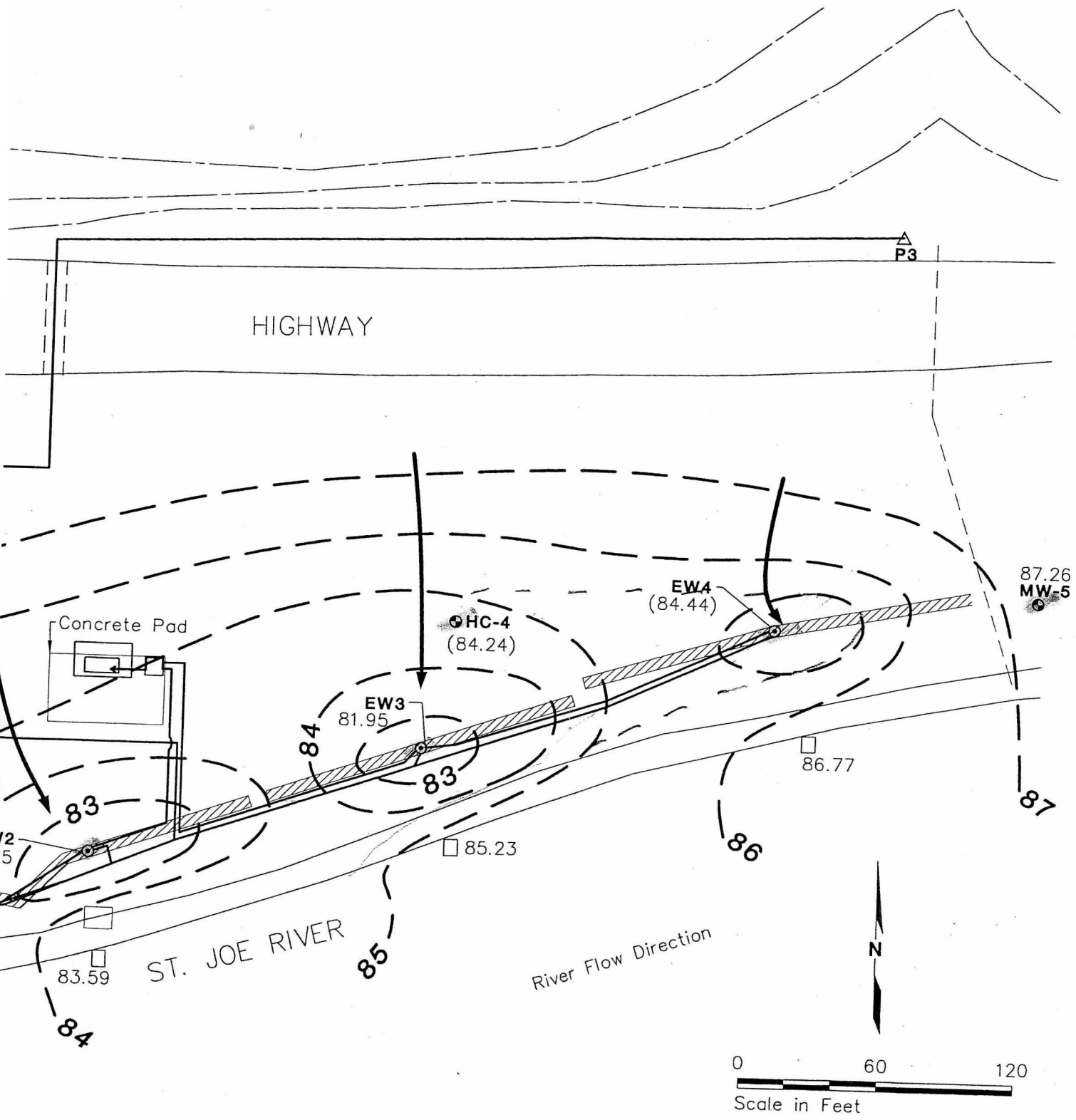
△ P1 Piezometer Location and Number

□ 82.58

— 87 —



tion Map



ated River Elevation in Feet (10/22/98)

ndwater Elevation Contour in Feet

roximate Groundwater Flow Direction

ction Trench

Note: Elevation datum is southwest corner of Concrete Pad (100.00 feet)

**HARTCROWSER**  
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Figure 1